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Brief 65-10280

# NASA TECH BRIEF



## Electron Bombardment Improves Vacuum Chamber Efficiency

**The problem:** To achieve greater efficiency in vacuum chambers without the costly and/or time consuming use of bake-out or cryogenic pumping methods.

**The solution:** Bombardment of the vacuum chamber walls by an electron gun placed within the chamber.

**How it's done:** A system designed to test certain lubricants in a high vacuum environment was equipped with an electron gun to bombard the test specimens with a 40 Kev electron beam. The purpose of this beam was the removal of contaminants adsorbed on the surface of the test specimens. As a result of turning on this electron gun for short periods, better vacuums resulted. Apparently adsorbed layers of gas vapor were being released from the chamber walls by a scrubbing action resulting from electron bombardment. The source of these electrons were those either missing or being reflected from the test specimen. Further experiments were made to verify this finding and resulted in vacuum increases from $10^{-8}$ mm Hg to $10^{-10}$ mm Hg occurring in a relatively short time.

**Notes:**

1. By the use of the electron gun within the test chamber, in conjunction with the standard vacuum pump-down system, an ultimate pressure of $10^{-13}$ mm Hg was reached as contrasted to the system barely reaching its design level of $10^{-10}$ mm Hg without the benefit of the electron gun.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B65-10280

**Patent status:** NASA encourages commercial use of this innovation. No patent action is contemplated by NASA.

Source: Max A.Swiker, John Przybyszewski, and John Watson
(Lewis-160)

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